



## Case report

## Assessment of the responsibility between a road traffic accident and medical defects after the traffic accident injury of knee joint

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## ABSTRACT

A 48-year-old Chinese woman was hit by a car in a road traffic accident. Local county hospital considered that her right knee was injured, but didn't find any sign of fracture from X-ray imaging. Then the hospital gave diagnosis of soft tissue contusion and the patient started to exercise with burden 21 days after her right lower limb was fixed by plaster slab. Four months later, she had to go back to the county hospital for recheck due to persistent pain on her right knee. Then, the right tibia outer plateau fracture was found. The patient rejected the advice of open reduction and internal fixation of right tibia plateau fracture. Instead, she accepted the unicompartmental knee arthroplasty in a hospital affiliated to a medical college. The patient felt the knee pain alleviated after surgery. However, the joint dysfunction was aggravated even more. The patient used the legal procedure for personal compensation. Both driver and the insurance company disputed that the final consequence of the injured knee was due to not only the traffic accident, but also poor medical practice involved. Therefore the court consigned us to make judicial judgment of expertise. After investigation, we found the earliest X-ray graph after the accident had shown the fracture of right tibia outer plateau and right knee valgum, with articular surface involvement, and the traffic accident was considered as the primary cause of sequelae. At the same time, the county hospital missed the diagnosis of fracture, and led to insufficient fixation of right lower limb, which was not good for rehabilitation from fracture and joint injury. This was the secondary cause of sequelae. Additionally, instead of the standard therapy, the affiliated hospital of medical college made the unicompartmental knee arthroplasty four months later, which also had a little defect. It was the minor reason for the result.

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## 1. Introduction

According to relevant legislation in the People's Republic of China (PRC), in the case of personal injury in the road traffic accident (RTA), if the outcome of injury result is affirmatory, the compensation of injury can be determined effortlessly. However, in some cases, other factors may complicate injury results caused by the RTA, and thus the case management becomes problematic. For example, some medical misconduct can aggravate the outcomes of injury. The injury caused by road traffic accidents or medical misconduct should be separated equitably, and different influences on the injury result should also be illustrated, which is called the Causal Force in Juris. Since there are some professional factors

involved in these cases, medicolegal experts are needed to solve these problems. Here we report a case combined with medical misconduct after an RTA.

## 2. Case report

A 48-year-old Chinese woman was injured by a car when she walked along the road on October 17th 2008. She felt pain in her right prothorax and her right knee was achy, swollen and dysfunctional. She was sent to the local county hospital after the accident. Clinicians there couldn't find any fracture in her thorax and right knee from X-ray imaging, and the diagnosis of soft tissue contusion was determined. Then her right lower limb was fixed with plaster slab and the traditional Chinese medicine was prescribed to help promote the blood circulation and dissolve stasis. After 21 days' treatment, the plaster slab was removed, and the patient began functional exercise. The symptom of pain on her

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thorax relieved; however, the situation of her knee became worse when she left the hospital on November 28th 2008. The discharge diagnosis was collateral ligaments injury.

Because of the continuous pain and dysfunction, she went back to the county hospital on February 12th and 14th 2009. The X-ray and MRI imaging showed the fracture of right tibia outer plate, the injury of right meniscus, and the effusion in the articular cavity. The county hospital advised her to accept an open reduction and internal fixation for fracture of right tibia outer plate, but she rejected the advice due to the lost of trust.

She then went to a different hospital, which was affiliated to a medical college. Then traumatic arthritis was diagnosed on February 18th 2009. She was operated for unicompartmental right knee arthroplasty on February 23rd 2009. She left the hospital without any complaint of complications on March 1st 2009.

The injured woman prosecuted the driver and the insurance company involved for the compensation of personal injury.

During the court hearing, both the driver and the insurance company argued that the woman's dysfunction of right knee was primarily due to the county hospital misdiagnosis of fracture, which led to the delay of effective treatment; at the same time, the unicompartmental knee arthroplasty without a clear medical indication was an incorrect decision which resulted in extra medical expenses. Therefore both the driver and the insurance company rejected the claim of compensation for extensive loss from misdiagnosis and wrong treatment.

To distinguish the liability involved, the court requested judicial expertise to determine the following two questions: (1) what factors caused the present result of the injured woman? (2) what proportion of each factor attributed to the injury if multi-factors were involved?

### 3. Clinical presentation

When the injured woman was admitted to the county hospital on October 17th 2008, the record of her physical examination stated: the skin of the right prothorax showed a little red colour without apparent abrasion; local tenderness and pain, thorax squeezing test (–); ache aggravated as deep respiration; the right knee was also achy and swollen; the active movement of the right knee was obviously limited and the passive movement aggravated the knee pain; knee lateral pressure test (+), drawer test (±).

It then stated on November 28th 2008, right lower limb was slight halting, right knee was swollen up with edema and lateral squeezing test (+).

On February 16th 2009, the county hospital diagnosis was recorded as: the fracture of right tibia outer plate; the injury of right meniscus. An open reduction and internal fixation surgery of fracture were proposed to the patient.

In the record of the hospital affiliated to the medical college on February 18th 2009, it showed that there is no apparent activity limitation of knee except localized pain.

Operation record on February 23rd 2009 showed: the distal lateral end cartilage of right femur and proximal lateral cartilage of tibia were rough; media and lateral meniscus were unbroken; there were synovial congestion, edema, proliferation and degeneration; the meniscus and plica alaris were excised, and unicompartmental right knee arthroplasty was then performed; the postoperative diagnosis was right knee traumatic arthritis.

### 4. Forensic medical investigation

On September 2nd 2009, the forensic medical experts investigated the case. The results were presented as follows:

The injured woman complained that she felt achy and uncomfortable following walking after the plaster was fixed on the right lower limb for 21 days, and the pain remained with only a little relief after the unicompartmental right knee arthroplasty.

Physical examination found that the woman showed claudication hobble and there was an oblique operational scar on the right knee, but no obvious swollen and achy. The right knee could not straighten out and bend completely, within the extent of 40–80°.

The X-ray imaging made on both October 17th 2008 and February 14th 2009 showed the sinking fracture of right tibia outer plate and slight eversion of the knee.

The MRI imaging of February 12th 2009 showed that both long T1 and T2 signal of right tibia lateral condyle, slight sinking of right tibia outer plate, effusion in articular capsule and infrapatellar bursa, the injury of media and lateral meniscus, and the injury of anterior cruciate ligament.

The CT imaging of February 19th 2009 showed the hyperplasia and sclerosis of right tibia outer plate, the defect of local sclerotin, the slight sinking of right tibia outer plate, and slight eversion of the knee.

The X-ray imaging of February 26th 2009 showed the signs of post-unicompartmental right knee arthroplasty.

### 5. Conclusion

After considering each party's role in the whole event, the forensic medical experts concluded that the right knee sequelae were primarily from the fracture of the right tibia outer plate caused by the traffic accident, which should account for the 60% of responsibility. The county hospital misdiagnosis of fracture and absence of effective fixation was thought to be the secondary cause, thus it should bear 30% responsibility. The premature operation of unicompartmental right knee arthroplasty was also defective, therefore, it should accounted for 10% responsibilities.

### 6. Discussion

The woman was hit by a car, and then the symptoms of swelling, pain and dysfunction on the right knee appeared immediately. The X-ray imaging promptly exhibited the apparent fracture of right tibia outer plate complicated with eversion of the knee. This fracture showed the dynamic changes seen from the following radiological imaging. According to this imagine evidence, the fracture of right tibia outer plate can be recognized as a result of the traffic accident. The doctors of the county hospital should have found the fracture based on the medical history and examination. However, the incorrect diagnosis was made due to the doctor's negligence, which should be considered as a serious medical mistake.

Tibia plateau, the contact surface between upper tibia and lower femur, constitute the knee joint.<sup>1</sup> Knee joint has three articular compartment including inner femur-tibia compartment, outer femur-tibia compartment and patella-femur compartment constituted by patella and femur trochlea. As a main burden structure, fractured articular surface is not smooth, and outer and inner stress is not symmetrical, which can lead to the traumatic arthritis with the symptoms of ache and dysfunction. Outer femur-tibia compartment, primarily involved in the fracture of tibia outer plate, is prone to traumatic arthritis, unicompartmental traumatic arthritis.<sup>2</sup>

Later image showed the articular surface was not smooth and the articular space became narrow. Additionally, the later operation confirmed the diagnosis of traumatic arthritis. Traumatic arthritis caused by joint injury was a chronic non-suppurative inflammation and was secondary to the joint fracture. In acute period, the hemorrhage and effusion of the joint could cause cartilage

deformity. Hematoma organization and fibrous proliferation also led to the roughness of articular surface. In addition, the movement could accelerate the abrasion of articular surface and made the articular degeneration more serious, which finally caused the fibrous ankylosis.<sup>1</sup>

In this case, the traumatic arthritis as the sequela and complication of the fracture of right tibia outer plate was caused by the accident. The accident injury played a key role in the development of traumatic arthritis, which should be the primary cause. According to WHO International Classification of Disability and Health we suggested the participation of injury reach about 60% (within a range between 56% and 95%).

Fracture of tibia outer plate can be treated using a surgical method or non-surgical method depending on patient's situation.<sup>3</sup> Generally, non-surgical patients should be fixed with plaster at least for 4–6 weeks. Patients receiving open reduction and internal fixation should keep themselves without burden for 4–6 weeks until bone healing, and functional exercises like walking may then follow. It is not suitable to remove external fixator or move with burden which may increase the incidence and severity of traumatic arthritis.<sup>1</sup> In this case, the injured woman began to exercise with burden too early, only 21 days after right knee was fixed with slab plaster. The imaging taken four months later showed bony defect and osteosclerosis, confirming the inappropriate healing of the original fracture. The county hospital missed the diagnosis of the fracture of right tibia outer plate and failed to make the effective immobilization. At this stage, the medical mispractice could be a significant factor for traumatic arthritis. Based WHO International Classification of Disability and Health, we advised the participation of the county hospital's medical mispractice should reach about 30% (within a range between 16% and 44%).

Although the patient suffered from ache and inconvenience due to the traumatic arthritis, no serious disability was observed. At the present time, the conservative treatment is recommended. If the effect of such a treatment is not satisfied, and continuous pain and progressive deformity have seriously affected the quality of life, doctors could consider surgeries, such as osteotomy, joint fusion and joint arthroplasty, to improve patient's situations.

In this case, the doctors from the affiliated hospital of a medical college conducted unicompartmental knee arthroplasty for the treatment of patient's traumatic arthritis only four months after patient's knee injury.<sup>4</sup> This is not appropriate for operation occasion definition. Based on the existed medical history, we believed that the best therapy should be fulfilling the collapsed fracture of right tibia outer plate, perfusion, cleaning, and drug therapy, so that the injured knee joint would have an opportunity to repair and maximally to retain original joint functions. In fact, doctors of affiliated

hospital of a medical college have found no obvious dysfunction of the right knee joint, only noticed circumscribed pain during movement before operation. The surgical intervention alleviated the symptom of pain, but aggravated joint dysfunctions. These lines of evidence demonstrated the failure of the operation. Thus, the selection of surgical approach and surgical timing is inappropriate. Applying unicompartmental knee arthroplasty not only deprived the injured of possibility for recovering and retaining of original joint function, but also aggravated the joint dysfunction.<sup>5</sup> According to WHO International Classification of Disability and Health, we advised the participation of the affiliated hospital of medical college should reach about 10% (within a range between 5% and 15%).

By analyzing and assessing the effects of trauma and the medical mispractice on the consequence of the injured knee after a traffic accident, we realized that final result was complex and caused by many factors, including traffic injury and medical intervention. Comprehensive and careful analysis would be helpful to determine the responsibility and resolve the compensational debate judicially.

#### Conflict of interest

We declare that we have no financial and personal relationships with other people or organizations that can inappropriately influence our work, there is no professional or other personal interest of any nature or kind in any product, service and/or company that could be construed as influencing the position presented in, or the review of, the manuscript entitled "Assessment of the responsibility between a road traffic accident and medical defects after the traffic accident injury of knee joint".

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#### Ethical approval

We strictly follow the ethical approval.

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